

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of	)	IB Docket No. 00-248
	)	
2000 Biennial Regulatory Review--	)	
Streamlining and Other Revisions of Part 25 of	)	
the Commission's Rules Governing the Licensing	)	
of, and Spectrum Usage by, Satellite Network	)	
Earth Stations and Space Stations	)	

**JOINT REPLY COMMENTS OF HUGHES NETWORK SYSTEMS,  
HUGHES COMMUNICATIONS, INC. AND  
HUGHES COMMUNICATIONS GALAXY, INC.**

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May 7, 2001

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## **Executive Summary**

Industry comments overwhelmingly confirm Hughes' view that the Commission's earth station rules have not kept pace with the technology, and the Commission should take this opportunity to change the technical parameters under which an earth station application is eligible for routine licensing. Advances in transmitter and receiver technology have permitted the use of 74 and 66 centimeter VSAT antennas at Ku band at high levels of performance, but without causing harmful interference. Neither the current rules nor the Commission's proposed rules fully reflect the significant advances in technology that have facilitated the development and deployment of these antennas.

Comments by earth station operators, space station operators, and antenna manufacturers reflect the need to establish a new standard to evaluate earth station performance. Thus, Hughes recommends that the Commission expand the types of earth station applications that are eligible for routine processing, in manner that could include 66 cm and 74 cm Ku band antennas. To do so, Hughes recommends that the Commission modify its reference antenna pattern, and also increase the power levels for outbound digital carriers.

In order to bring the Commission's rules in line with the rapidly changing technology in the satellite industry, Hughes proposes that the definition of "routine" Ku band earth stations be expanded to include those VSAT earth stations that conform to the following requirements: (i) in the receive direction, meet a modified form of the antenna gain pattern currently codified in Section 25.209(a)(1), and (ii) in the transmit direction, meet an off-axis EIRP density mask similar to the Ka band rules in Section 25.138 of the Commission's rules.

Specifically, Hughes and every commenter addressing this point proposed to update the antenna gain pattern rules by beginning the off-axis angle at 1.8 degrees or greater. Hughes also proposes to increase the maximum EIRP spectral density limit for digital outbound carriers to 9 dBW/4kHz for narrowband carriers, and proposes a maximum EIRP density of 13 dBW/4kHz for single carrier full-transponder and dual-carrier full-transponder transmissions.

The types of changes proposed by Hughes would facilitate the deployment of the latest antenna technology, minimize administrative burdens on the Commission, and reduce the regulatory burdens on earth station applicants and satellite operators. In sum, these changes would foster the Commission's deregulatory goals.

In contrast to the industry's support for developing new standards, every satellite and earth station operator that addressed the issue agrees that the Commission should not adopt its proposal to reduce the power for random access networks because such a rule is unnecessary and overly burdensome. The Commission's proposal would be a radical change to the existing rules and attempts to be a solution to a problem that does not exist. Moreover, the Commission's proposal would result in an overly burdensome increase in systems costs, as a result of expensive and time consuming "retooling" of VSAT systems that have operated for years in reliance on existing Commission rules that do not preclude Aloha access.

Thus, the Commission should adopt the Hughes proposals to modify the antenna reference pattern and increase the power levels for outbound digital carriers. However, the Commission should not adopt its proposal to require VSAT earth stations using Aloha random access and TDMA techniques to reduce their power. These and other Hughes proposals are further discussed in these Reply Comments.

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HUGHES COMMUNICATIONS, INC. AND  
HUGHES COMMUNICATIONS GALAXY, INC.**

Hughes Network Systems, Hughes Communications, Inc. and Hughes Communications Galaxy, Inc. (together "Hughes") hereby reply to the comments filed in response to the Commission's Notice of Proposed Rule Making<sup>1</sup> in this proceeding. These comments overwhelmingly confirm Hughes' view that the Commission's earth station rules have not kept pace with the technology and that the Commission should take this opportunity to change the technical parameters under which an earth station application is eligible for routine licensing.

**I. INTRODUCTION**

As noted in Hughes' Comments, advances in transmitter and receiver technology have permitted the use of smaller and smaller aperture Ku band antennas at high levels of performance, but without causing harmful interference. In particular, these advances have permitted the deployment of tens of thousands of 74 and 66 centimeter very small aperture

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<sup>1</sup> *In the Matter of 2000 Biennial Regulatory Review – Streamlining and Other Revisions of Part 25 of the Commission's Rules Governing the Licensing of, and Spectrum Usage by,*

terminal (“VSAT”) antennas at Ku band. Neither the current rules nor the Commission’s proposed rules fully reflect the significant advances in technology that have facilitated the development and deployment of these antennas.

The current Ku band rules were promulgated at a time when VSAT satellite technology was still in its early stages, and the prospect of deploying antennas less than 1.2 meters in the Ku band simply was not envisioned. Since then, enhanced pointing and interference mitigation technology have been developed, satellite power levels have increased, transmit/receive earth station diameters have been reduced to as small as 66 centimeters, and satellite communications have become a reality for hundreds of thousands of consumers. Nevertheless, these small antennas do not meet the Commission’s current guidelines for routine processing, and applications to use these antennas are generally subject to the time-consuming and burdensome consequences of a case-by-case review.

The NPRM proposes to address this problem by proposing some clear guidelines about how this case-by-case review will occur in the future. Hughes does not object to the Commission’s overall efforts to “regularize” or streamline the method for processing non-routine earth station applications. However, Hughes has recommended more expansive changes in its Comments. Specifically, Hughes recommended that the Commission broaden the types of earth station applications that are eligible for routine processing, in a manner that could include 66 cm and 74 cm Ku band antennas. To do so, Hughes recommended that the Commission modify the Ku band reference antenna pattern in its rules, and also increase the power levels for outbound digital carriers at Ku band.

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*Satellite Network Earth Stations and Space Stations*, FCC 00-435 (released Dec. 14, 2000) (“NPRM”).

Comments by earth station operators, space station operators, and antenna manufacturers reflect the need to establish a new standard to evaluate earth station performance. Specifically, these comments support a change in the antenna reference pattern at Ku band. Similarly, the industry comments fully support an increase in the maximum downlink EIRP spectral density limit for digital outbound carriers.

Taken together, these types of changes would broaden the number of earth station applications that are eligible for routine licensing without adversely affecting the harmful interference environment. In turn, this would mean fewer instances where the applicant would need to invoke the complicated affidavit/coordination earth station licensing proposal that the Commission made in the NPRM in an effort to accommodate new antenna technology. Thus, these types of changes in the Commission's rules would facilitate the deployment of the latest antenna technology, minimize administrative burdens on the Commission, and reduce the regulatory burdens on earth station applicants and satellite operators. In short, these changes would foster the Commission's deregulatory goals.

## **II. THE COMMISSION SHOULD ADOPT THE HUGHES PROPOSALS TO EXPAND THE CATEGORY OF ROUTINE ANTENNAS**

### **A. Industry Supports Updating the Current Reference Antenna Pattern to Include Smaller Antennas**

In order to bring the Commission's rules in line with the rapidly changing technology in the satellite industry, Hughes proposed in its Comments that the definition of "routine" Ku band earth stations be expanded to include those VSAT earth stations that conform to the following requirements: (i) in the receive direction, meet a modified form of the antenna gain pattern rules currently codified in Section 25.209(a)(1), and (ii) in the transmit direction, meet an off-axis EIRP density mask similar to the Ka band rules in Section 25.138 of the Commission's Rules.



Specifically, Hughes and every commenter addressing this point proposed to update the antenna gain pattern rules for the Ku band by beginning the off-axis angle at 1.8 degrees or greater.<sup>2</sup> Advances in earth station and satellite technology over the past ten years have resulted in antennas smaller than 1.2 meters that can meet a side lobe envelope beginning at 1.8 degrees off-axis. Antennas that conform to an antenna gain pattern beginning at 1.8 degrees off-axis, by definition, are fully consistent with the Commission's two degree spacing requirement and, therefore, will not cause harmful interference to adjacent satellite systems. Thus, antennas less than 1.2 meters in diameter in the Ku band that comply with a side lobe envelope beginning at 1.8 degrees off-axis should be considered "routine" and should not require additional review by the Commission.

Hughes also proposed an off-axis EIRP density mask in the transmit direction to permit a VSAT earth station applicant to optimize its transmit power and antenna mask. An earth station applicant would be constrained only by the combination of power density and antenna gain, rather than needing to satisfy each constraint individually. In this way, earth station operators would have the flexibility to adjust their power density depending on the nature of their antenna masks. As noted by Astrolink, the adoption of an off-axis EIRP spectral density mask "permit[s] applicants to 'trade-off' antenna performance versus power in light of their

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<sup>2</sup> See e.g. Comments of Andrew Corporation at 2 ("[T]he Commission should change the starting angle defined in 25.209(a)(1) from 1 degree to 2 degrees.") (*Comments of Andrew Corp.*); Joint Comments of Hughes Network Systems, Hughes Communications, Inc. and Hughes Communications Galaxy, Inc. §§II, IIIA ("Hughes proposes to modify the antenna gain pattern rules for the Ku band by beginning the off-axis angle at 1.8 degrees rather than 1 degree.") (*Comments of Hughes*); Comments of Spacenet Inc. and Starband Communications Inc. at 12-14 ("[T]he Commission [would] truly streamline its rules by amending Subsection 25.209(g) to allow routine licensing of Ku band VSAT earth stations using antennas that are within the 29-25 log theta envelope at angles of 2 degrees and greater.") (*Comments of Spacenet/Starband*).

specific earth station designs and service requirements.”<sup>3</sup> This proposal provides earth stations with the flexibility to achieve a certain balance between power density and antenna gain patterns similar to the Commission’s rules for the Ka band as codified in Section 25.138.<sup>4</sup>

Hughes supports Spacenet/Starband’s proposal to include a parameter of 3 degrees for the off-axis angle perpendicular to the orbital plane in the transmit direction. Hughes confirms Spacenet/Starband’s conclusion that a 3 degree elevational standard will not create unacceptable interference.<sup>5</sup> To accommodate this parameter, Hughes proposes to use an off-axis EIRP density mask in the transmit direction that is compatible with Article S22.26 of the International Telecommunications Union Radio Regulations.<sup>6</sup> Hughes has modified the revised Section 25.134 included in Hughes’ Comments to incorporate this additional specification, as set forth more fully in Appendix A to these Reply Comments.

In the NPRM, the Commission proposes to streamline the processing of earth station applications with non-routine antenna gain patterns by requiring applicants to (1) reduce power and/or (2) submit affidavits from space station operators.<sup>7</sup> To implement the first option of these streamlining proposals, the Commission proposes to create a new Section 25.220 for non-routine earth stations that would require an EIRP density vs. off-axis angle criterion beginning at 1 degree off-axis. The Commission notes that very small antennas at these lower power levels might be practical for satellite-delivered Internet services.<sup>8</sup>

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<sup>3</sup> Comments of Astrolink International LLC at 3 (*Comments of Astrolink*).

<sup>4</sup> See 47 C.F.R. §25.138.

<sup>5</sup> Comments of Spacenet/Starband at 12-13.

<sup>6</sup> International Telecommunications Union Radio Reg., art. S22.26, §9.

<sup>7</sup> NPRM ¶8.

<sup>8</sup> NPRM ¶18.

However, reducing power levels to the low level required to comply with the 1 or 1.25 degree off-axis requirements, as currently provided,<sup>9</sup> would not encompass the new technology intrinsic to the Hughes two way DirecPC Ku band high-speed satellite broadband service. The Comments of Spacenet/StarBand confirm the difficulties with the Commission's proposal. As discussed in those Comments, "[r]educing the transmit power and power density of the sub-meter antennas used by StarBand and other providers of satellite-based Internet service to the level required by proposed Section 25.220 would degrade the quality of service offered, thereby affecting the competitive position of VSAT operators."<sup>10</sup>

Instead of the Commission's proposed changes, Hughes and every other commenter addressing this point propose to update the antenna mask for the Ku band to begin at off-axis angles of 1.8 degrees or greater. In light of this consensus, Hughes urges the Commission to adopt this new criteria. Doing so would accommodate the use of VSAT antennas as small as 66 cm or 74 cm that are uniquely-suited for satellite delivery of Internet services to consumers and businesses and would not increase the interference environment for adjacent satellite systems. Further, the Hughes approach of separately addressing transmit and receive parameters of an earth station is also supported by the industry.<sup>11</sup> Thus, Hughes strongly recommends that the Commission adopt the Hughes proposals.

**B. Industry Supports Increasing the Maximum Downlink EIRP Spectral Density Limit for Digital Outbound Carriers**

The comments strongly support an increase in the maximum downlink EIRP spectral density limit for digital outbound carriers. As discussed by Loral, an increase from 6

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<sup>9</sup> See generally NPRM ¶11n.19; see also 47 C.F.R. § 25.209(g).

<sup>10</sup> Comments of Spacenet/Starband at 21.

<sup>11</sup> Comments of Andrew Corp. at 3.

dBW/4kHz to 9 dBW/4kHz “will facilitate the deployment of millions of consumer VSAT terminals to support broadband consumer applications. It will enable a larger number of applications to be approved under the routine licensing regime and continue to give the satellite operators the flexibility to resolve other difficult inter-satellite coordination issues.”<sup>12</sup> As noted by Spacenet/StarBand, “[b]y increasing the allowable downlink power, the Commission will also allow VSAT systems . . . to take advantage of technological improvements in the satellite industry.”<sup>13</sup> Spacenet/StarBand proposed a similar increase to 9 dBW/4kHz for narrowband digital carriers.<sup>14</sup>

These proposals are consistent with the Hughes proposal to increase the maximum GSO FSS satellite EIRP spectral density limit for narrowband outbound digital emissions from 6 dBW/4kHz to 9 dBW/4kHz.<sup>15</sup> This proposed increase would permit the use of QPSK or higher modulation carriers with existing and smaller VSAT antennas.

As discussed in the Hughes Comments, the proposed increase to 9 dBW/4kHz, even if applied to all VSAT related outroute carriers (those carriers transmitted by a hub earth station and received by VSATs), would not cause unacceptable levels of harmful interference to existing systems operating under the 6 dBW/4kHz limit. Hughes also proposed a maximum EIRP density of 13 dBW/4kHz for single carrier full-transponder and dual-carrier full-transponder digital transmissions.

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<sup>12</sup> Comments of Loral Space and Communications, Ltd. at 10 (*Comments of Loral*).

<sup>13</sup> Comments of Spacenet/StarBand at 30.

<sup>14</sup> *Id.* at 31.

<sup>15</sup> New Skies Satellites N.V. proposed the adoption of limits for the downlink power of C band satellites based on levels of inhomogeneities. Comments of New Skies Satellites N.V. at 4-5 (*Comments of New Skies*). Hughes believes that, in the context of the Ku band, absolute numbers rather than inhomogeneities are more suited to provide the standard for downlink power limits.

Hughes does not support the PanAmSat proposal to increase the maximum EIRP density limit to 10 dBW/4kHz for all digital carriers.<sup>16</sup> The 9 dBW/4kHz proposal by Hughes provides adequate power for all envisioned narrowband services, and the 13 dBW/4kHz proposal by Hughes provides a means of ensuring the power required by wideband services. Hughes opposes Spacenet/Starband's proposal to increase the maximum EIRP density limit to 16 dBW/4kHz for wideband digital carriers.<sup>17</sup> Hughes believes that such a power level would create unacceptable levels of interference into other wideband digital services operating on adjacent satellites. However, Hughes believes that the 16 dBW/4kHz proposal could be appropriately reevaluated in the future once NGSO Ku band systems are launched.

Hughes opposes Spacenet/StarBand's proposal to increase the uplink power limit from -14dBW to -11dBW if the Commission adopts its proposed Section 25.220.<sup>18</sup> The -11 dBW value would create unacceptable levels of interference into adjacent satellites and cause undue coordination burdens for the satellite operators. Hughes believes Spacenet/Starband's concerns would be adequately addressed by Hughes' proposal to modify the antenna reference pattern and increasing the type and size of Ku band antennas that would be routinely processed, which is widely supported by others in the industry.

Industry comments support defining the terms "narrowband" and "wideband." As stated in its Comments, Hughes does not agree with the Commission's proposed definition of "wideband." Rather, Hughes proposed to define as "wideband" any carriers with a bandwidth greater than 5 MHz.

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<sup>16</sup> See Comments of PanAmSat Corporation at 9-10 (*Comments of PanAmSat*).

<sup>17</sup> See Comments of Spacenet/Starband at 31.

<sup>18</sup> *Id.* at 29.

**C. The Interference Potential of Ku Band Antennas Smaller Than 1.2 Meters is Unaffected by the Station Keeping Tolerances of Current Satellite Systems**

As noted in its Comments, Hughes believes that an increase in the number of antennas that do not conform to the current off-axis requirements of Section 25.209(a)(1) (i.e., are smaller than 1.2m) would not unreasonably increase the likelihood of unacceptable interference taking into consideration the station-keeping tolerances of existing satellite systems. As the Commission recognized, interference from drifting satellites will not be a serious concern in most cases.<sup>19</sup> No commenting party takes a different view.<sup>20</sup>

**D. An Increase in the Number of Ku Band Antennas Smaller Than 1.2 Meters Would Not Adversely Impact Existing Coordination Agreements of Satellites Interleaved at 1 Degree Apart**

The comments strongly support the position that an increase in the number of antennas that do not comply with the current antenna gain pattern envelope of Section 25.209(a)(1) would not adversely impact existing coordination agreements with respect to satellites interleaved at 1 degree apart. As noted by PanAmSat, “[t]he spatial isolation of beams on interleaved satellites provides protection against all but gross antenna pointing errors. The introduction of antennas that do not satisfy the antenna gain pattern at less than two degrees off-axis, therefore, should not significantly increase the risk of interference.”<sup>21</sup>

**E. The Commission Should Provide the Industry with Time to Reach a Consensus on an Antenna Reference Pattern and a Downlink EIRP Spectral Density Limit**

The comments indicate that the industry is very close to consensus on a number of the technical issues in this proceeding. As discussed above, Hughes and every other commenter

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<sup>19</sup> NPRM ¶ 27.

<sup>20</sup> PanAmSat suggests that station-keeping issues be explored in industry discussions to ensure that the current station-keeping tolerances are maintained. *See generally* Comments of PanAmSat at 5-6.

addressing the point proposed to update the antenna reference pattern rule for the Ku band by beginning the off-axis angle at 1.8 degrees or greater. The individual proposals ranged from 1.8 degrees to 2 degrees. Similarly, the industry comments strongly support an increase in the maximum downlink EIRP spectral density limit for digital outbound carriers. These proposals also were within a manageable range for reaching a consensus. Hughes is confident that the industry can reach final agreement on these technical issues. Thus, Hughes requests that the Commission provide the satellite industry with a reasonable period of time to reach a consensus on these important technical standards.

### **III. PROCEDURES TO IMPLEMENT THE COMMISSION'S STREAMLINING PROPOSALS FOR NON-ROUTINE ANTENNAS**

#### **A. Hughes Supports Industry Proposals to Require Coordination Before a Non-Routine Application is Filed**

Hughes supports industry proposals to require the completion of coordination with satellites +/- six degrees of the operating satellite prior to filing an application for non-routine operations.<sup>22</sup> Hughes also proposes that satellite operators must respond with any objections within 30 days of the request of the earth station applicant, and any non-responding satellite operator should be deemed to have assented. These procedures, if adopted, will speed the processing of non-routine earth station applications and will mitigate the opportunity to use coordination as a barrier to competitive market entry.

Hughes also supports Spacenet/Starband's proposal to establish an automatic grant period. As noted by Spacenet/Starband, the Commission can implement this process by creating a list or register of acceptable antennas. Applicants proposing to use an antenna on the

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<sup>21</sup> Comments of PanAmSat at 6; *see also* Comments of Andrew Corp. at 3.

<sup>22</sup> *See* Comments of Loral at 6-7; *see also* Comments of PanAmSat at 8.

approved list would be presumed compliant and granted automatically.<sup>23</sup> Similar to the prior coordination proposal discussed above, this proposed automatic grant procedure would facilitate the streamlining of non-routine earth station applications.

**B. Submission of Antenna Gain Patterns When Applicants Seek Authority to Use a Non-Routine Antenna**

The Commission has proposed to require submission of antenna gain patterns when applicants seek authority to use a non-routine antenna.<sup>24</sup> Hughes supports the proposal of Spacenet/StarBand that the Commission maintain a database of antenna patterns so that applicants could indicate the file number of the applicable antenna pattern on their application rather than actually needing to submit the patterns.<sup>25</sup>

PanAmSat proposes to require applicants to serve their applications, with patterns included, on adjacent satellite operators within six degrees of the eastern and western edges of the coordinated arc.<sup>26</sup> If the Commission adopts this proposal, Hughes suggests that the language should be clarified to read that applicants will serve their applications on “adjacent satellite operators +/- 6 degrees of each satellite with which the non-routine applicant seeks to coordinate.” Also, if this proposal is adopted, the Commission should adopt a mechanism that clearly identifies who should be served, such as creating a database on its web site that provides contact information for all U.S. licensed satellite operators, on a slot by slot basis. Establishing this type of mechanism is very important to facilitating the prompt filing and processing of applications.

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<sup>23</sup> Comments of Spacenet/Starband at 43-44.

<sup>24</sup> NPRM ¶25.

<sup>25</sup> Comments of Spacenet/Starband at 46.

<sup>26</sup> Comments of PanAmSat at 5.



#### IV. THE COMMISSION SHOULD EXTEND THE TERM OF EARTH STATION LICENSES TO 15 YEARS

The comments overwhelmingly support the Commission's proposal to extend the license term for all earth stations from 10 years to 15 years, and similarly to extend the term of receive-only registrations to 15 years.<sup>27</sup> In addition, Hughes supports Astrolink's proposal to extend the license term to 15 years for associated space stations that have not yet become operational. Hughes agrees that the operational life spans of satellites have been extended by advances in technology.<sup>28</sup> Also, with respect to the Ka band, earth stations are designed to operate with an individual Ka band system; therefore, equivalent earth station and space station license terms would significantly reduce the administrative burdens associated with the provision of Ka band satellite services.<sup>29</sup>

Hughes also proposed that the Commission delete Section 25.131(i) of its Rules. This rule requires registrants of receive-only earth stations in bands that are shared with terrestrial users to notify the Commission when a station has not been used during any 6-month period.<sup>30</sup> Hughes believes that this rule is an unwarranted and burdensome requirement, and is not necessary in any event. Hughes is not aware of any evidence to suggest that registered receive-only terminals are typically unused for periods of 6 months or longer. Thus, this rule should be deleted as part of the Commission's regulatory streamlining effort.

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<sup>27</sup> Comments of Astrolink at 8; Comments of Globalstar USA, Inc. and Globalstar, L.P. at 4 (*Comments of Globalstar*); Comments of Hughes at 17; Comments of PanAmSat at 11; Comments of Spacenet/Starband at 46; Comments of Worldcom, Inc. at 2 (*Comments of Worldcom*).

<sup>28</sup> Comments of Astrolink at 8.

<sup>29</sup> *Id.* at 9.

<sup>30</sup> 47 C.F.R. §25.131(i).

**V. THE COMMISSION’S PROPOSAL TO REDUCE THE POWER FOR RANDOM ACCESS VSAT NETWORKS IS UNNECESSARY AND OVERLY BURDENSOME**

Every satellite and earth station operator that addressed this issue agrees that the Commission should not adopt its proposal to reduce the power for random access networks because such a rule is unnecessary and overly burdensome.<sup>31</sup> GE Americom “supports allowing the use of random access techniques.”<sup>32</sup> GE Americom’s “experience has been that such operations have not resulted in unacceptable interference.”<sup>33</sup> Similarly, Loral “is not aware of any reported incidents of unacceptable interference attributable to the operation of these networks at the current ‘blanket licensing’ levels”<sup>34</sup> and “believes this proposal may be unnecessary.”<sup>35</sup>

As an operator of over 100,000 VSAT terminals, Hughes also is not aware of any interference issues that are attributable to Aloha collisions. Furthermore, as discussed in the Hughes Comments, the proposed limits on Aloha access in a TDMA or FDMA environment are unnecessary from a technical viewpoint.<sup>36</sup> Moreover, as aptly stated by Spacenet/Starband, “the Commission’s proposed regulatory intrusion is unnecessary” because “the industry’s need to assure a service that is competitive with wireline and other terrestrial services will preclude

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<sup>31</sup> See e.g., Comments of GE American Communications, Inc. at 4 (*Comments of GE Americom*); Comments of Loral at 12; Comments of Spacenet/Starband at 38.

<sup>32</sup> Comments of GE Americom at 4.

<sup>33</sup> *Id.*

<sup>34</sup> Comments of Loral at 12.

<sup>35</sup> *Id.* at 11.

<sup>36</sup> Comments of Hughes at 19-21, app. A. Hughes acknowledges that CDMA and CDMA/Aloha techniques may present unique issues, but these concerns simply do not apply in a TDMA mode. Hughes believes that continuous (i.e. – pure FDMA) carriers are rare in the VSAT environment and will continue to be so.

excessive collisions.”<sup>37</sup> Thus, the Commission’s proposal would be a radical change to the existing rules and attempts to be a solution to a problem that does not exist.

Moreover, the industry has provided data that contradicts the Commission’s tentative finding that a 3dB reduction in power still “would provide a technically viable service.”<sup>38</sup> As noted in the Hughes Comments, the Commission provides no evidence to support its contention of technical viability. To the contrary, Hughes can attest that this 3dB of excess link margin is not available for these purposes. VSAT networks do not have 3 dB, or in many cases even 1dB, of *excess* link margin to be sacrificed for these purposes. Astrolink confirms Hughes’ view that the Commission’s proposed “3 dB reduction in power density or off-axis e.i.r.p. density levels would render many satellite links unusable, or at a minimum, seriously affect a system’s achievable availability and capacity.”<sup>39</sup>

Instead, if this power reduction were imposed, antenna sizes would need to be increased, or the systems would be limited to relatively bandwidth-inefficient modulation/coding schemes. In either case, the Commission’s proposal to reduce the power for Aloha systems would result in an overly burdensome increase in system costs, as a result of expensive and time consuming “retooling” of VSAT systems that have operated for years in reliance on existing Commission rules that do not preclude Aloha access.

For the same reasons, Hughes opposes the proposal of Aloha Networks to limit the maximum power spectral density to  $-14.0 - 10 \log(N)$  db (W/4kHz) where N is the smallest number of co-frequency simultaneously transmitting earth stations in the same satellite receiving beam such that the probability of an event greater than N simultaneous transmitters is less than

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<sup>37</sup> Comments of Spacenet/Starband at 38.

<sup>38</sup> NPRM ¶ 56.

0.1%. A probability of collision of less than 0.1% is unnecessarily low, and, in any event, the Commission already has determined that the probability of less than 1.0% is negligible.<sup>40</sup> Moreover, as discussed in the comments of every satellite and earth station operator addressing this issue, no demonstrable need exists for establishing any approach, either the Commission's or that of Aloha Networks, to solve a problem that does not exist today and will not likely exist in the future.

Thus, the overwhelming consensus of the earth station operators and the satellite operators is that the Commission's proposal to reduce the power for random access VSAT networks is unnecessary and overly burdensome, and should not be adopted. Nevertheless, if the Commission desires to adopt a rule with respect to Aloha access, consensus exists for the adoption of the Hughes average power proposal.<sup>41</sup> As discussed in the Spacenet/Starband Comments, the Hughes approach is the "most general and simplest proposal."<sup>42</sup> Therefore, it satisfies the Commission's determination that "a more general and simplified approach will better facilitate the licensing of earth stations that use these techniques."<sup>43</sup>

Also, as noted in the Spacenet/Starband Comments, "[b]ecause the rules related to adjacent satellite interference on the earth-to-space link are defined on a power spectral density

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<sup>39</sup> Comments of Astrolink at 12.

<sup>40</sup> See NPRM app. E, § III(E). "Under the conditions proposed by Spacenet (Poisson distribution with 38% channel load), we determine that a smaller than 1% probability of carrier collision would be acceptable as a good tradeoff."

<sup>41</sup> See Comments of Spacenet/Starband at 40; Comments of Astrolink at 13; *see also* Comments of Hughes Network Systems in the Matter of Petition of Spacenet, Inc. For a Declaratory Ruling that Section 25.134 of the Commission's Rules Permit VSAT Remote Stations in the Fixed Satellite Service to Use Network Access Schemes that Allow Statistically Infrequent Overlapping Transmissions of Short Duration; or in the Alternative For Rule Making to Amend That Section, RM-9864 (filed May 30, 2000).

<sup>42</sup> Comments of Spacenet/Starband at 40.

basis (power per unit bandwidth), interference caused by collisions from VSAT transmissions will not affect the victim systems with smaller bandwidth to any greater extent than a carrier of equal bandwidth . . . due to the fact that the victim earth station's receiver will only receive the amount of the interference power that falls within the narrower bandwidth to which the victim receiver is tuned."<sup>44</sup> Therefore, any Commission concern that the Hughes proposal might not adequately address instances in which the bandwidth of the earth station causing interference was wider than the victim's bandwidth is unfounded.<sup>45</sup>

Notwithstanding overwhelming industry opposition, if the Commission chooses to adopt its proposed rule revision or that of Aloha Networks, the Commission should grandfather the use of random access techniques for existing VSAT networks. These existing networks have been built out based on the current rules, which do not even address the use of random access techniques.

Hughes also believes that none of the proposed rules should be adopted for the Ka band systems that are preparing for operations in the next year or two.<sup>46</sup> Hughes disagrees with Astrolink that proposals made in this proceeding for the Ku band could be appropriate for the Ka band.<sup>47</sup> Hughes believes that it is premature to adopt restrictive rule revisions prior to the satellites being launched and an industry practice having developed in the Ka band.

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<sup>43</sup> NPRM ¶ 54.

<sup>44</sup> Comments of Spacenet/Starband at 39.

<sup>45</sup> *See generally* NPRM ¶ 54.

<sup>46</sup> NPRM ¶ 57.

<sup>47</sup> *See* Comments of Astrolink at 14.

## **VI. THE COMMISSION SHOULD ADOPT A STREAMLINED VERSION OF FORM 312 FOR ROUTINE EARTH STATION APPLICATIONS**

Industry comments generally support the Commission's proposal to adopt a streamlined version of Form 312 for routine earth station applications. However, as noted in the Hughes Comments, in order to receive routine processing and be eligible for the "auto-grant" process, the applicant must affirmatively respond to whether the proposed antenna complies with the antenna gain standard in Section 25.209(a) and (b).<sup>48</sup> As discussed above, Hughes proposes to expand the category of routine antennas by updating the antenna reference pattern rules. Therefore, Hughes proposes that the new form be modified to incorporate its proposed changes to the antenna gain pattern, and refer to revised §25.134 as well.

Hughes supports the proposal by Globalstar to incorporate a "Not Applicable" option for any question to which this answer may be appropriate.<sup>49</sup> As noted by Globalstar, information that may be applicable to applicants requesting licenses in the conventional C band or Ku band may not be applicable to applicants requesting licenses in other bands.<sup>50</sup>

## **VII. THE COMMISSION SHOULD NOT REQUIRE MANDATORY ELECTRONIC FILING**

The majority of commenters addressing this issue oppose the Commission's proposal to require mandatory electronic filing as the sole means of filing.<sup>51</sup> Although the Commission's desire to create a more comprehensive database and process applications more quickly is commendable and necessary, as noted by Spacenet/Starband, "the Commission [should] ensure that the system is fully functional before making electronic filing mandatory."<sup>52</sup>

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<sup>48</sup> See generally NPRM ¶ 69; see also NPRM app. D, No. 03.

<sup>49</sup> Comments of Globalstar at 8.

<sup>50</sup> *Id.*

<sup>51</sup> See Comments of Hughes at 25-26; see also Comments of Spacenet/Starband at 45.

<sup>52</sup> Comments of Spacenet/Starband at 45.

Spacenet/Starband explain that “[t]he system is sometimes unavailable, it sometimes will not work with certain browser software commonly used by applicants; and it has trouble accepting the quantity of data necessary to describe a large network with multiple sites and antennas.”<sup>53</sup>

These issues are particularly serious for petitions to deny that must be filed within a prescribed time period to be entitled to certain procedural rights and for applications that have to be filed by the close of a processing round. As Hughes suggested in its Comments, rather than making electronic filing the only means of filing, the Commission should continue to accept paper filings and perhaps require an electronic filing of the document within thirty days. In this way, the applicant is assured of a timely filing, and the Commission’s goals could be satisfied as well. The Commission could review the maturity of the electronic filing system during the next Biennial Review.

#### **VIII. ANY EXTENSION OF THE POWER LIMITS OF SECTIONS 25.211 AND 25.212 TO OTHER FSS BANDS MUST BE APPROPRIATE TO THE TYPE OF SERVICE**

The majority of commenters addressing this issue expressed concern that the Commission’s proposal is too vague and needs to be specifically tailored to identify the frequency bands to which it may apply.<sup>54</sup> Hughes recommends that if the Commission determines it necessary, it could undertake service specific rule makings on the appropriate power limits for those services and frequency bands.

#### **IX. OTHER MATTERS**

##### **A. The Commission Should Clarify the Construction Completion Requirement in the Ka band**

In its Comments, Astrolink proposes that the Commission relax the construction completion requirement for Ka band blanket licensed earth stations so that licensees may use the

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<sup>53</sup> *Id.*

term of their license to build out.<sup>55</sup> In the past, the Commission provided Ku band VSAT licensees four years to complete construction.<sup>56</sup> However, that requirement was relaxed in 1996 so that licensees are now permitted to use the entire license term to build out.<sup>57</sup> In the Ka band blanket licensing order, the Commission determined that the term of the blanket license would coincide with the term of the space station license. Hughes interpreted that decision to provide that licensees could build out their earth stations over the term of the blanket license. However to avoid any possible ambiguity with respect to the length of time permitted to build out a blanket license in the Ka band, Hughes supports Astrolink's proposal that the Commission state that a Ka band earth station licensee has the full license term to build out.<sup>58</sup>

**B. The Commission Should Modify its Pro Forma Application Rules**

Hughes supports Loral's proposal to eliminate the need for prior approval of pro forma transfers of control or assignments of authorizations.<sup>59</sup> A pro forma transfer of control does not involve an actual transfer of ultimate control. Rather, a pro forma transfer often involves merely a corporate restructuring or reorganization. Nevertheless, these pro forma transfers require the same processing fees as non-pro forma transfers and often take months to process.<sup>60</sup> Hughes agrees with Loral and urges the Commission to modify its rules in order to streamline the processing of these pro forma transactions and reduce the associated processing fees, as it has done for other services.

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<sup>54</sup> See e.g., Comments of Astrolink at 16; Comments of Hughes at 26.

<sup>55</sup> *Id.* at 5-6.

<sup>56</sup> See NPRM ¶46n.55.

<sup>57</sup> *Id.*

<sup>58</sup> Comments of Astrolink at 5-6.

<sup>59</sup> Comments of Loral at 16-18.

<sup>60</sup> See generally *id.* at 16-17.



**C. Hughes Opposes PanAmSat's Proposed Operating Conditions for Two-Way Consumer Terminals Because they are Impractical and Unnecessary**

Hughes opposes PanAmSat's proposed operating conditions for two-way consumer terminals. PanAmSat has not demonstrated why it is necessary to impose such conditions or how current Commission rules in Part 25, Subpart D (Technical Operations) are inadequate.<sup>61</sup> Specifically, PanAmSat proposes that (1) system design must inhibit transmit capability of the unit until correct pointing of the antenna can be confirmed through quantifiable measurements, (2) system design must allow the transmit capability to be disabled remotely, (3) transmit antenna installations must be performed by a professional unless quantifiable pointing verification can be made remotely, and the transmit function disabled until specified antenna pointing performance is achieved, (4) system design permits interference to be traced to individual subscribers, including those systems that dynamically re-assign transmit frequencies, and (5) excessive interference problems will lead to a review of the system's design and possibly increased operating restrictions or revocation of license.<sup>62</sup>

The first proposal above is impractical because an operator cannot quantifiably determine that an antenna has been correctly pointed until the antenna has been installed and tested. Yet, the proposal would require that the system design inhibit transmit capability of the unit until correct pointing of the antenna can be confirmed through quantifiable measurements. As a result, this proposed requirement could never be met. Moreover, the term "correct pointing" is vague and may have different meanings depending on the characteristics of the specific antenna. The same types of problems exist with respect to the third proposal.

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<sup>61</sup> See 47 C.F.R. Subpart D.

<sup>62</sup> Comments of PanAmSat at 13.

The second proposal is unnecessary because the Commission's rules already require the system design to include the ability to remotely disable the transmit function.<sup>63</sup> The fifth proposal is similarly unnecessary because the Commission already possesses plenary authority to take appropriate enforcement actions to solve harmful interference problems, and the Commission has an existing rule to address procedures for resolving interference problems.<sup>64</sup>

Finally, the fourth proposal also is unnecessary. Existing rules require that earth station operators be able to identify terminals causing harmful interference and solve such problems.<sup>65</sup> No reason exists to require that this information be included as part of an earth station application. This information is proprietary and should not be a matter of public record. Hughes urges the Commission to reject the proposals of PanAmSat as being unnecessary, overly burdensome, or already covered by the existing rules.

## **X. CONCLUSION**

For the foregoing reasons, the Commission should adopt the Hughes proposals to modify the reference antenna pattern and increase the power levels for outbound digital carriers. In addition, the Commission should adopt Hughes' proposed definition for "wideband" and those other changes to Part 25 described in these Reply Comments, in Appendix A to these Reply Comments, and in Appendix B to the Hughes Comments.

The Commission should not adopt its proposal to require VSAT earth stations using Aloha random access and TDMA techniques to reduce their power. In addition, the Commission should not adopt its mandatory electronic filing proposal at this time. Finally, the

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<sup>63</sup> See 47 C.F.R. §25.271.

<sup>64</sup> See 47 C.F.R. § 25.271; *see also* 47 C.F.R. §25.274.

<sup>65</sup> *See id.*

Commission should not adopt PanAmSat's proposed operating requirements for two-way consumer terminals.

Respectfully submitted,

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May 7, 2001

## Appendix A

### Hughes' Proposed Rule Revisions

As a result of consultation with industry commenters, Hughes has modified the proposed Section 25.134(a)(1) from the original proposal, as previously set forth in Appendix B to the Hughes Comments. Section 25.134(a)(1) has now been split into subsections (a)(1)(a) and (a)(1)(b). The following proposed Section 25.134, in its modified form, should be substituted for the originally proposed Section 25.134 in the Hughes Comments. No other changes have been made.

For the convenience of the reader, the text of the current Commission rule appears below in plain text. Additional text proposed by the Commission in the NPRM appears in bold type, and text proposed by the Commission to be deleted in the NPRM appears with a single strikethrough.

Hughes' proposed additions appear in italics and Hughes' proposed deletions appear with a double strikethrough.

§25.134 Licensing provisions of very small aperture terminal (VSAT) networks.

- (a) ~~All applications for digital VSAT networks with a maximum outbound downlink EIRP density of +6.0 dBW/4 kHz per carrier and earth station antennas with maximum input power density of -14 dBW/4 kHz and maximum hub EIRP of 78.3 dBW will be processed routinely. All applications for analog VSAT networks with maximum outbound downlink power densities of +13.0 dBW/4 kHz per carrier and maximum antenna input power densities of -8.0 dBW/4 kHz shall be processed routinely in accordance with Declaratory Order in the Matter of Routine Licensing of Earth Stations in the 6 GHz and 14 GHz Bands Using Antennas Less Than 9 Meters and 5 Meters in Diameter, Respectively, for Both Full Transponder and Narrowband Transmissions, 2 FCC Red 2149 (1987) (Declaratory Order).~~
- (b) ~~Each applicant for digital and/or analog VSAT network authorization proposing to use transmitted satellite carrier EIRP densities in excess of +6.0 dBW/4 kHz and +13.0 dBW/4 kHz, respectively, and/or maximum antenna input power densities of -14.0 dBW/4 kHz and maximum hub EIRPs of 78.3 dBW and -8.0 dBW/4 kHz per carrier, respectively, shall conduct an engineering analysis using the Sharp, Adjacent Satellite Interference Analysis (ASIA) program. Applicants shall submit a complete description of those baseline parameters they use in conducting their analysis and tabular summaries of the ASIA program's output detailing potential interference shortfalls. Applicants shall also submit a narrative summary which must indicate whether there are margin shortfalls in any of the current baseline services as a result of the addition of the new applicant's high power service, and if so, how the applicant intends to resolve those margin shortfalls. Applicants shall submit link budget analyses of the operations proposed along with a detailed written explanation of how each uplink and each transmitted satellite carrier density figure is derived. Applicants shall provide proof by affidavit that all~~

potentially affected parties acknowledge and do not object to the use of the applicant's higher power density.

- (a) All applications for VSAT service in the 12/14 GHz band that meet the following requirements will be routinely processed:

~~(1) The maximum transmitter power spectral density of a digital modulated carrier into any GSO FSS earth station antenna shall not exceed  $14.0 - 10\log(N)$  dB(W/4 kHz).~~

- ~~(i) For a VSAT network using frequency division multiple access (FDMA) or time division multiple access (TDMA) technique, N is equal to one.~~  
~~(ii) For a VSAT network using code division multiple access (CDMA) technique, N is the likely maximum number of co-frequency simultaneously transmitting earth stations in the same satellite receiving beam.~~  
~~(iii) For a VSAT network using contention Aloha multiple access technique, N is equal to two.~~  
~~(iv) For a VSAT network using contention CDMA/Aloha multiple access technique, N is twice the likely maximum number of co-frequency simultaneously transmitting earth stations in the same satellite receiving beam without contention.~~

- (1)(a) If the GSO FSS earth station antenna off-axis EIRP spectral density for co-polarized digital signals does not exceed the following values, under clear sky conditions, in the plane of the geostationary satellite orbit as it appears at the particular earth station location:

$15 - 25 \log(\theta) - 10 \log(N)$	dBW/4kHz	for	$1.8^\circ \leq \theta \leq 7^\circ$
$-6 - 10 \log(N)$	dBW/4kHz	for	$7^\circ < \theta \leq 9.2^\circ$
$18 - 25 \log(\theta) - 10 \log(N)$	dBW/4kHz	for	$9.2^\circ < \theta \leq 48^\circ$
$-14 - 10 \log(N)$	dBW/4kHz	for	$48^\circ < \theta \leq 180^\circ$

where  $\theta$  is the angle in degrees from the axis of the main lobe.

- (i) For a VSAT network using frequency division multiple access (FDMA) or time division multiple access (TDMA) technique, N is equal to one.

- (ii) For a VSAT network using code division multiple access (CDMA) technique, N is the maximum number of co-frequency simultaneously transmitting earth stations in the same satellite receiving beam.

- (1)(b) If the GSO FSS earth station antenna off-axis EIRP spectral density for co-polarized digital signals does not exceed the following values, under clear sky conditions, in all other directions:

$32 - 25 \log(\theta) - 10 \log(N)$	dBW/4kHz	for	$3^\circ \leq \theta \leq 7^\circ$
$11 - 10 \log(N)$	dBW/4kHz	for	$7^\circ < \theta \leq 9.2^\circ$
$35 - 25 \log(\theta) - 10 \log(N)$	dBW/4kHz	for	$9.2^\circ < \theta \leq 48^\circ$
$-7 - 10 \log(N)$	dBW/4kHz	for	$48^\circ < \theta \leq 180^\circ$

where  $\theta$  is the angle in degrees from the axis of the main lobe.

(i) For a VSAT network using frequency division multiple access (FDMA) or time division multiple access (TDMA) technique,  $N$  is equal to one.

(ii) For a VSAT network using code division multiple access (CDMA) technique,  $N$  is the maximum number of co-frequency simultaneously transmitting earth stations in the same satellite receiving beam.

- (2) If the GSO FSS earth station antenna off-axis EIRP spectral density for cross polarized digital signals does not exceed the following values, under clear sky conditions, in the plane of the geostationary satellite orbit as it appears at the particular earth station location:

$5 - 25 \log(\theta) - 10 \log(N)$	dBW/4 kHz	for	$1.8^\circ \leq \theta \leq 7^\circ$
$-16 - 10 \log(N)$	dBW/4 kHz	for	$7^\circ < \theta \leq 9.2^\circ$

where  $\theta$  is the angle in degrees from the axis of the main lobe.

(i) For a VSAT network using frequency division multiple access (FDMA) or time division multiple access (TDMA) technique,  $N$  is equal to one.

(ii) For a VSAT network using code division multiple access (CDMA) technique,  $N$  is the maximum number of co-frequency simultaneously transmitting earth stations in the same satellite receiving beam.

- (3) If the maximum GSO FSS satellite EIRP spectral density of the digital modulated emission of any transmission (other than a single-carrier full-transponder transmission, or a dual-carrier full-transponder transmission) ~~shall~~ does not exceed 9dB (W/4kHz) ~~6 dB (W/4kHz)~~ for all methods of modulation and accessing techniques.
- (4) If the maximum GSO FSS satellite EIRP spectral density of the digital modulated emission of a single-carrier full-transponder transmission, or a dual-carrier full-transponder transmission, does not exceed 13dB (W/4kHz) for all methods of modulation and accessing techniques.
- (5) If the maximum ~~hub earth station~~ EIRP of the hub earth station supporting the VSAT network ~~shall~~ does not exceed 78.3 dBW per carrier for all methods of

**multiple access techniques, and supporting VSAT network identified in paragraph (a)(1) of this section.**

- (6) *If the maximum transmitter power spectral density of an analog carrier into any GSO FSS earth station antenna shall not exceed – 8.0 dB(W/4kHz) and the maximum GSO FSS satellite EIRP spectral density shall not exceed + 13.0 dB(W/4kHz).*
- (7) *If the antenna meets the requirements of Section 25.209(a) and (b) for receive purposes.*
- (b) **Each applicant for digital and/or analog VSAT network authorization proposing to use transmitted satellite carrier EIRP densities, maximum transmitter power and/or earth station antenna off-axis EIRP density (as applicable) ~~maximum antenna input power~~ in excess of those specified in paragraph (a) of this Section must comply with the procedures set forth in § 25.220 of this Chapter.**
- (c) ~~Licenses authorized pursuant to paragraph (b) of this section shall bear the burden of coordinating with any future applicants or licensees whose proposed compliant VSAT operations, as defined by paragraph (a) of this section, is potentially or actually adversely affected by the operation of the non-compliant licensee. If no good faith agreement can be reached, however, the non-compliant licensee shall reduce its power density levels to those compliant with Section 25.212, the VSAT Order or the Declaratory Order, whichever is applicable.~~
- (d) ~~An application for VSAT authorization shall be filed on FCC Form 312, Main Form and Schedule B. A VSAT licensee applying to renew its license must include on FCC Form 405, the number of constructed VSAT units in its network.~~
- (d) **An application for VSAT authorization shall be filed on FCC Form 312, Main Form and Schedule B. A VSAT licensee applying to renew its license must follow the procedures provided in § 25.121(c)(3) of this part.**